

Appendix A – Resource protection measures to be implemented under the proposed action

The resource protection measures for federally-listed species are in the first section. They are followed by protection measures grouped by activity, protection measures for specific resources, and protection measures for environmentally sensitive zones (Table A-1). Resource protection measures are actions designed to reduce impacts of proposed activities. They are derived from applicable law, regulation, or policy and include such things as best management practices (BMPs), forest and grassland plan standards and guidelines, and standard operating procedures. Analyses were completed assuming the implementation of all resource protection measures.

Protection measures for federally listed species

- No concentrated, intense weed control activities (human disturbance, motorized, mechanical, and aerial applications) will be allowed within 2 miles of greater sage-grouse breeding complexes from March 1 through June 30, unless the district biologist determined in advance that the control activity would have no detrimental effect.
- Apply herbicides at concentrations that will avoid tree mortality to protect potential habitat for raptors, lynx, and other key species. Refer to Table A-1 for detailed protection measures in and near wooded areas.
- Prohibit or modify pesticide use where it would have adverse effects on threatened, endangered, proposed, sensitive species or species of local concern, and minimize risk to other non-target species.

Protection measures specific to Preble's meadow jumping mouse

- If proposed chemical treatments will reduce density and/or height of tall grass structure within Preble's meadow jumping mouse habitat (up to 300 feet outside the 100 year floodplain, below 8,100 feet on the MBNF) then other treatments, such as hand-pulling or biocontrol, would be used to maintain habitat quality.
- In habitat suitable for Preble's meadow jumping mouse, prescribed fires will be designed to burn no more than 25% of the Preble's habitat within each linear mile stretch of habitat. The percentage of habitat actually burned in each linear mile will be reported to the U.S. Fish and Wildlife Service. Because of the unpredictability of fire, this standard will be achieved if no more than one of every four fires exceeds the 25% limit in size. If more than two of the first eight fires in Preble's habitat exceed 25% of the suitable habitat, the Forest Service will consult with the U.S. Fish and Wildlife Service to revise this standard (ES-6-WY-04-F003, Wyoming Ecological Services Field Office).
- Following burns in suitable habitat within the range of Preble's meadow jumping mouse, on-site surveys will be conducted to determine if vegetation has recovered, using U.S. Fish and Wildlife Service guidelines (ES-6-WY-04-F003, Wyoming Ecological Services Field Office).
- During project planning, if potential habitat occurs in the project area, survey for threatened, endangered, proposed, and candidate species on the US Fish and Wildlife Service's species list for the forest. Provide mitigation of potential adverse effects for species present.
- In suitable Preble's meadow jumping mouse habitat, prescribed burning will only occur during their hibernation period (October 1 to May 15).
- Require hand application of herbicide within 50 feet of the edge of water (from table A-1, general protection measures for streamside zones).

Reasonable and prudent measures (from the USFWS biological opinion)

The USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Preble's meadow jumping mouse:

1. The Medicine Bow – Routt National Forests and the Thunder Basin National Grassland shall avoid or minimize take of Preble's through the implementation of worker education programs and well-defined operational procedures with the cooperation of qualified, journey-level wildlife biologists and botanists.
2. The Medicine Bow – Routt National Forests and the Thunder Basin National Grassland will require timely revegetation and enhancement of project areas to minimize the disturbance to Preble's habitat.
3. Reevaluate the use of prescribed fire for those years during which there is greater likelihood of activity of Preble's either late in the fall or earlier in the spring than is indicated by the typical hibernation period of Nov. 1 – April 30.

Terms and conditions (from the USFWS biological opinion)

In order to be exempt from the prohibitions of Section 9 of the Act, the MBRTB must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implement reasonable and prudent measure #1:

1. The Medicine Bow - Routt National Forests and the Thunder Basin National Grassland shall ensure that proposed conservation measures (see Preble's-specific protection measure listed above), as further refined by these terms and conditions, are formally adopted and implemented.
2. The Medicine Bow - Routt National Forests and the Thunder Basin National Grassland shall monitor the extent of Preble's habitat annually and cumulatively impacted to ensure that it does not exceed the anticipated area of suitable habitat likely to be disturbed as a consequence of implementation of the proposed action.
3. Project activities in Preble's habitat shall not occur within Preble's active season (May 1 through October 31), or project activities in Preble's habitat during this active season shall occur during daylight hours.
4. In habitat suitable for Preble's meadow jumping mouse, the use of prescribed fire shall not occur during Preble's active season (May 1 through October 31). This term and condition differs from the conditional application of this measure as a guideline in the current Medicine Bow National Forest Land and Resource Management Plan. But, this term and condition is consistent with the intent conveyed within the biological assessment (p. 45) and the draft environmental impact statement (p. 80) prepared for the proposed action. This is applicable to suitable Preble's habitat throughout the action area.
5. If a botanist or biologist, in their best professional judgment, believes that proposed treatments would reduce density and/or composition of native grass and shrub communities within suitable Preble's meadow jumping mouse habitat (up to ~400 feet outside of the immediate riparian area, or 300 feet beyond the 100 year floodplain if this may be accurately depicted, and below 8,100 feet on the Medicine Bow National Forest) then other treatments, such as spot-treatment with herbicides, hand-pulling, or biocontrol will be used.

6. A wildlife biologist shall conduct a training session for all implementing project personnel prior to any site-specific implementation. At a minimum, the training shall include a description of Preble's and its habitat general provisions of the Endangered Species Act, the specific measures being implemented to conserve Preble's during implementation, and the boundaries of the implementation area.
7. Work areas shall be kept clean to avoid attracting human-commensal predators of Preble's. All food-related trash items shall be enclosed in sealed containers and regularly removed from any project area.

The following terms and conditions implement reasonable and prudent measure #2:

8. The Medicine Bow - Routt National Forests and the Thunder Basin National Grassland shall require that temporarily disturbed areas in suitable Preble's habitat are revegetated within one to two years following treatment with native vegetation to the following specifications:
 - At least 80 percent of shrubs and trees are established and growing without showing signs of stress.
 - Grass and wetland plant (rushes, sedges, etc.) coverage in restored areas equals at least 80 percent of comparable undisturbed areas nearby.
 - Noxious weeds or non-native and invasive plants may cover no more than five percent of the surface area of the enhanced/ restored areas.
9. The Medicine Bow - Routt National Forests and the Thunder Basin National Grassland shall include, as a binding condition of project implementation in suitable Preble's habitat, annual monitoring of treated habitat. This shall include photographs and shall include other necessary information to determine the extent and effects of implementation. Monitoring will extend for at least three years (or until such time as the Medicine Bow - Routt National Forests and the Thunder Basin National Grassland and the Service determine that habitat has recovered, if affected, or that revegetation has been successfully completed, as applicable).

The following term and condition implements reasonable and prudent measure #3:

10. When considering the use of fire in suitable Preble's habitat, the Medicine Bow - Routt National Forests and Thunder Basin National Grassland shall, in accordance with policy requiring the site-specific preparation of prescribed burn plans, include consideration of ambient temperatures that may alter the normal hibernation period of Preble's. That is, whenever possible, implementation of prescribed burns should be avoided during periods of above average temperature following the onset of hibernation (Nov. 1) or prior to the emergence from hibernation (April 30).

Reporting requirement (from the USFWS biological opinion)

The Medicine Bow - Routt National Forests and the Thunder Basin National Grassland shall provide an annual written report, consistent with the timing of Forest Service annual monitoring (e.g., reporting related to implementation of the Southern Rockies Lynx Amendment) detailing any implementation of the proposed action in suitable Preble's habitat. This report shall contain a discussion of the activities conducted, the approximate acreage of Preble's habitat affected, any problems encountered in implementing the terms and conditions, recommendations for modifying the terms and conditions to enhance the conservation of Preble's, results of biological surveys and sighting records, and any other information that the Medicine Bow - Routt National Forests and the Thunder Basin National Grassland consider pertinent to the conservation of Preble's.

The Service anticipates that no more than 24.25 acres of Preble's habitat will be disturbed annually as a result of the use of prescribed fire to treat non-native and invasive species. We anticipate that the loss

of approximately 24 Preble's home ranges will occur in any given 10-year period or 48 home ranges in the 20-year period associated with the expected duration of the record of decision for this action. We estimate that this is equivalent to the loss of 48 individual Preble's over the 20-year decision of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

In the unlikely event that a Preble's mouse is encountered (dead, injured, or hibernating) during implementation, the Wyoming Field Office of the Service shall be contacted at 307-772-2374 immediately.

Conservation recommendations (from the USFWS biological opinion)

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service recommendations are as follows:

1. In general, other project activities within or near existing Preble's habitat should take place outside Preble's active season (May 1 through October 31).
2. The Service recommends that the MBRTB continue to implement water improvement projects in suitable Preble's habitat comparable to the Pole Mountain Water Improvements Project (W. Munro 2011). That is, to continue to modify range water sources so that tanks are located outside of riparian areas and buck-and-rail fencing is used to exclude livestock from riparian areas in the immediate vicinity of water sources such as springs or seeps.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Protection measures for federally listed plant species

There are no federally listed plant species on the MBRTB. Potential habitat for Ute ladies' tresses (*Spiranthes diluvialis*) is suspected on the Thunder Basin and a few low-lying valleys in the Sierra Madre and on the Routt. Potential habitat was surveyed by USFS botanists in 2011 and 2012; no occurrences of Ute ladies'-tresses were discovered.

General guidance – The following apply to the development of all potential herbicide treatment projects:

- A survey of all suitable TEP plant habitat within the proposed action areas by a journey-level botanist or botanically qualified biologist, ecologist, or range management specialist to determine the presence/absence of TEP species. A minimum 2 consecutive years of survey will be required to determine presence/absence of Ute ladies' tresses (*Spiranthes diluvialis*) in suitable habitat.
- Establishment of site-specific, limited activity and no activity buffers identified by a qualified botanist, biologist, or ecologist in areas of occupied habitat within the proposed project area. Activities in these areas would be extremely limited or prohibited to protect occupied habitat.

- Collect baseline information on the existing condition of TEP plant species and their habitats in the proposed project area.
- Evaluate post-treatment monitoring data to track the effect of treatments on the size and vigor of TEP plant populations and the state of their habitats. This monitoring data would help in anticipating the future effects of vegetation treatments on TEP plant species.
- Assess potential needs for post-treatment site revegetation to minimize the opportunity for noxious weed invasion and establishment into occupied TEP plant habitat.

Treatments near occupied TEP plant habitat – At a minimum, the following restrictions must be applied:

- Given the high risk for damage to TEP plants and their habitat from burning, mechanical treatments, and use of domestic animals to contain weeds, none of these treatment methods should be utilized within 330 feet of sensitive TEP plant populations unless the treatments are specifically designed to maintain or improve the existing population. Grazing and mechanical treatments such as haying may be employed in Ute ladies' tresses habitat if weed treatments will also enhance habitat suitability for this species.
- Off-highway use of motorized vehicles associated with treatments should be avoided in occupied habitat.
- Biological control agents that affect target plants in the same genus as TEP plants must not be used to control target species occurring within the dispersal distance of the agent.
- Prior to use of biological control agents that affect target plants in the same family as TEP plants, the specificity of the agent with respect to factors such as physiology and morphology should be evaluated and a determination as to risks to the TEP species made.
- Herbicide treatments should not be conducted in areas where TEP plant species may be subject to direct spray by herbicides during treatments.
- To avoid negative effects to TEP plant species from off-site drift, surface runoff, and/or wind erosion, suitable buffer zones should be established between treatment sites and populations of TEP plant species and site-specific precautions should be taken (refer to the guidance provided below). Buffer zone distances will vary by method of treatment, chemical used and TEP plant habitat type.
- Within buffer zones, limited herbicide treatments such as low boom spraying and spot treatment via hand held wands, backpack sprayers, wicking, etc. may be conducted if the threat of weed invasion into occupied TEP plant habitat is thought to be greater than the threat of herbicide use. Treatment in buffer zones must be approved by a qualified botanist or biologist and will only occur if the treatment is not thought to pose risks to TEP plant populations. A minimum no-activity buffer of 25 feet will be maintained around all TEP plants. Precautions such as the construction of physical barriers, treatment during TEP plant dormancy, and treatment during favorable climatic conditions will be used to protect TEP plant populations from herbicide drift and other indirect impacts.
- Follow all label instructions, resource protection measures and Forest Service standards and guidelines to avoid spill and direct spray scenarios into aquatic habitats that support TEP plant species.
- Follow all resources protection measures for avoiding herbicide treatments during climatic conditions that would increase the likelihood of spray drift or surface runoff.

For broadcast spraying of herbicides, ground (high boom) or aerial: Manual spot treatment and low boom ground application of undesirable vegetation can occur within the listed buffer zones if it is determined by local botanists or designated resource specialists that this method of herbicide application

would not pose risks to TEP plant species in the vicinity. Additional precautions during spot treatments of vegetation within habitats where TEP plant species occur should be considered while planning local treatment programs.

The buffer distances provided below are conservative estimates, based on the information provided in past analyses by the BLM (USDI Bureau of Land Management 2007) and are designed to provide protection to TEP plants. Herbicides approved in the future and not listed below will be subject to limited and no-activity buffer distances and other appropriate restrictions designed to protect TEP plant populations.

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- Do not high boom or aerially spray within ½ mile of terrestrial TEP plant species or aquatic habitats where TEP aquatic plant species occur.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile down gradient from the treatment area.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Chlorsulfuron

- Do not apply by high boom ground methods within 1,200 feet of terrestrial TEP plant species.
- Do not apply by aerial methods within 1,500 feet of terrestrial TEP plant species.
- Do not apply by low boom or spot treatment methods within 25 feet of aquatic habitats where TEP plant species occur.
- Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic habitats where TEP plant species occur.
- Do not apply by aerial methods at the typical application rate within 100 feet of aquatic habitats where TEP plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Clopyralid

- Do not apply by aerial methods within ½ mile of terrestrial TEP plant species.
- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by low boom ground methods at the typical application rate within 900 feet of terrestrial TEP plant species.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Dicamba

- Do not apply by low boom or high boom ground methods at any application rate (typical or maximum) within 1,050 feet of terrestrial TEP plant species.
- Do not apply by any method within 25 feet of aquatic habitats where TEP plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Glyphosate

- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species.
- Do not apply by low boom ground methods at the maximum application rate within 300 feet of terrestrial TEP plant species.
- Do not apply by low boom ground methods at the typical application rate within 50 feet of terrestrial TEP plant species.
- Do not apply by aerial methods within 300 feet of terrestrial TEP plant species.

Hexazinone

- Since the risks associated with using a high boom or an aerial application are unknown, do not apply by aerial or high boom ground methods within ½ mile of terrestrial TEP plant species and aquatic habitats that support aquatic TEP species.
- Do not apply by low boom ground methods at the typical application rate within 300 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species.
- Do not apply by low boom ground methods at the maximum application rate within 900 feet of terrestrial TEP plant species or aquatic habitats that support aquatic TEP plant species.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Imazapic

- Do not apply by aerial methods at the maximum application rate within 300 feet of aquatic TEP species.
- Do not apply by aerial methods at the typical application rate within 100 feet of aquatic TEP plant species.
- Do not apply aerially by plane at the maximum application rate within 900 feet of terrestrial TEP plant species.
- Do not apply aerially by helicopter at the maximum application rate, or by plane at the typical application rate, within 300 feet of terrestrial TEP plant species.
- Do not apply aerially by helicopter at the typical application rate within 25 feet of terrestrial TEP plant species.
- Do not apply by high or low boom ground methods within 25 feet of terrestrial TEP plant species or aquatic habitats where TEP plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Imazapyr

- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply at the maximum application rate, by low boom ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP plant species occur.
- Do not apply at the typical application rate, by low boom ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP plant species occur.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Metsulfuron methyl

- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply at the maximum application rate, by low boom ground or aerial methods, within ½ mile of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- Do not apply at the typical application rate, by low boom ground or aerial methods, within 900 feet of terrestrial TEP plant species or aquatic habitats in which aquatic TEP species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Picloram

- Do not apply by low or high boom ground or aerial methods, at any application rate, within ½ mile of terrestrial TEP plant species.
- Assess local site conditions when evaluating the risks from surface water runoff to TEP plants located within ½ mile down gradient from the treatment area.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Sulfometuron methyl

- Do not apply by high or low boom ground or aerial methods within 1,500 feet of terrestrial TEP plant species.
- Do not apply by aerial methods within 1,500 feet of aquatic habitats where TEP plant species occur.
- Do not apply by low or high boom ground methods within 900 feet of aquatic habitats where TEP plant species occur,
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Triclopyr acid

- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by low boom ground or aerial methods at the maximum application rate within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species.
- Do not apply by low boom ground methods at the typical application rate within 300 feet of terrestrial TEP plant species.
- If applying to aquatic habitats in which aquatic TEP plant species occur, do not exceed the targeted water concentration on the product label.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Triclopyr BEE

- Since the risks associated with using a high boom are unknown, do not apply by high boom ground methods within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by low boom ground or aerial methods at the maximum application rate within ½ mile of terrestrial TEP plant species or aquatic habitats in which TEP plant species occur.
- Do not apply by aerial methods at the typical application rate within 500 feet of terrestrial TEP plant species.
- Do not apply by low boom ground methods at the typical application rate within 300 feet of terrestrial TEP plant species.
- Do not use aquatic formulations in aquatic habitats where TEP aquatic plant species occur.
- In areas where wind erosion is likely, do not apply within ½ mile of TEP plant species.

Protection measures by activity

Prevention of weed introduction and spread

- Educate all Forest Service field personal so they are aware of, and knowledgeable about, invasive plant species (FSM 2902).
- On NFS lands, it is prohibited to possess or store any hay, hay cubes, straw, grain, or other forage or mulch product, without original and current documentation from a state certification process which meets or exceeds the North American Weed Free Forage (NAWFF) or comparable certification standard (USDA Forest Service, Rocky Mountain Region Weed Free Forage Products Order R2-2005-01) This includes products used for revegetation projects by the U.S. Forest Service.
- Use contract and permit clauses to prevent the introduction or spread of noxious weeds by contractors and permittees (FSM 2904, Amendment No. 2000-95-5). This includes timber sale contract clauses RO-K-G.6.0.2#, RO-K-GT.6.0.2#, RO-C6.602#, RO-CT6.602# and B6.35, and special use permit clauses R2-D-103 (R2 Supplement 2709.11-2006-1).
- All purchased seed should be certified noxious weed free (refer to MBRTB Revegetation Guidelines).
- Where noxious weeds or other harmful invasive plant species are present on a project site or near enough to pose a threat of colonizing disturbed areas, seed the disturbed area with approved plant materials as specified in the MBRTB Revegetation Guidelines.
- Before using any gravel, topsoil or other fill products on NFS lands, be sure the source, pits, or stockpiles have been treated and are free of noxious weeds. Sites should be inspected regularly. All gravel, topsoil or other fill products to be used on NFS lands will be pre-treated before transporting.

Prevention measures specific to wildfire:

- Minimize weed spread in fire camps by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes, and washing equipment.
- Inspect all vehicles involved in fire suppression regularly to assure that undercarriages and grill works are kept free of weed seeds.

Coordination

- Where traditional cultural plant gathering areas have been identified, tribal consultation may be done to address any additional mitigation measures needed to minimize effects to various aspects of the activity. These could include, but are not limited to, adjusting the timing of the treatment, adjusting the type of treatment, and adjusting the priority of the treatment.
- If any treatment is desired within RNA boundaries, concurrence must be obtained from the cooperating USFS research station and all other relevant partners prior to treatment implementation.
- In cooperation with federal, state, and county agencies, NFS lands adjacent to other ownership will be selectively treated to coincide with active invasive plant management projects. Decisions regarding treatment methods and buffer width on land adjacent to privately owned land or land managed by other agencies will be negotiated between the Forest Service and the other owner/agency.
- District or forest invasive plant coordinators will coordinate a review of invasive plant management projects with the district/forest resource specialists to identify specific resource conditions that may be affected by control activities and to ensure the protection measures are implemented properly.
- If treatment is desired in Special Interest Areas (SIAs) that have special values, treatment must be planned and executed with concurrence from the appropriate forest program manager for that value.

Travel management compliance

- Treatment activities will follow local motorized travel management plan or applicable public land laws, rules, regulations, and orders. Variances to motorized travel plans may be allowed for administrative motorized access to conduct weed treatment activities in areas approved by the authorized officer.

Prescribed burning

General

- Any prescribed burning conducted for weed control will be conducted in accordance with Medicine Bow-Routt National Forests and Thunder Basin National Grassland fire management policy which requires the site-specific preparation of a prescribed burn plan before every burn.
- Avoid burning sites with high risk of weed invasion unless effective post-burn treatment methods and funding are incorporated into project planning.

Sagebrush habitat

- Restrict or contain fire within normal range of fire activity (assuming a healthy native perennial sagebrush community), including size and frequency, as defined by the best available science.
- Limit intentional fires in sagebrush habitats, including prescribed burning of breeding and winter habitats unless it can be demonstrated to be beneficial to local sage grouse populations.
- Design and implement restoration of burned sagebrush habitats to allow for natural succession to healthy native sagebrush plant communities.

Sagebrush habitat, cont.

- Implement monitoring programs for restoration activities. Monitoring must continue until restoration is complete.
- Immediately suppress wildfire in all sagebrush habitats.

Biological control

- Only biological control agents that have been approved by USDA Animal Plant Health Inspection Service (APHIS) will be released.
- Where biocontrol agents have become successfully established, protect those sites from other forms of weed control to promote spread of the biocontrol agents and provide collection locations for release at other sites.

Livestock grazing

- Consider the timing, stocking rate, and duration of permitted livestock grazing following invasive plant treatment to optimize treatment effectiveness depending on the amount and type of treatment, treatment objectives, and site-specific conditions.
- All proposals for domestic goat or sheep grazing for weed control on the national forests will be coordinated with the appropriate state wildlife management agency biologist to determine potential impacts to bighorn sheep.
- Domestic sheep and/or goats may only be used for invasive plant control if consultation with district and forest biologists and state wildlife management agencies indicate the risk of disease transmission to bighorn sheep is very low. Using the risk-of-contact tool is recommended (O'Brien et al. 2014, Carpenter et al. 2014, and USDA Forest Service 2013).
- If funding or personnel are not available to complete the risk-of-contact tool, then targeted grazing by domestic sheep or goats will not occur within 6 miles of the seasonal ranges documented by the state wildlife management agencies within the Encampment River, Douglas Creek, Laramie Peak, Zirkel, Gore Canyon, and Flat Tops bighorn sheep herds.
- Domestic sheep or goats used for weed control must be confined to the weed treatment area, and the risk of straying animals must be minimized using a combination of the following methods:

For all weed-control sheep or goat bands

- Sheep and goats must be effectively herded or confined with fencing to assure the target invasive is being removed or reduced in density, and the animals must be removed as soon as the weed treatment has been accomplished.
- Domestic sheep or goats that stray out of the weed control area pose a risk of interaction and will be reported immediately to the local Forest Service office, and every effort will be made by the operator to return any strays to the weed control area or remove them from the national forest as soon as possible or as otherwise specified by the Forest Service.

For large bands (greater than 50 animals)

- Maintain an appropriate ratio of marker sheep within bands. Depending on local needs and conditions, ratios should be no less than 1 marker for every 100 adult sheep. More markers may be required when dictated by local conditions.
- Place mature and effective guard dogs with the livestock and/or employ both day and night herders to keep predators from scattering the stock.
- Place bells on at least 1 in every 100 mature ewes/does to help locate sheep or goats that escape containment by the herder or fence.

For small bands (50 animals or fewer)

- Operators will count every domestic sheep or goat every morning and afternoon to verify that none have escaped the weed control area.
- Avoid grazing female ewes or does that are not pregnant on treatment areas on the national forests because female sheep and goats in estrus attract bighorn rams.
- Provide instruction/training and supervision for those tending livestock used for targeted grazing concerning recognizing bighorn sheep and allowable methods for preventing contact between bighorn sheep and domestic bands.
- Operators will immediately notify the Forest Service and the state wildlife management agency if bighorn sheep come in contact with domestic sheep or goats. Sheepherders will be expected to provide exact location of bighorn sheep at last sighting.
- Domestic sheep and goats used for weed control should be in good health. Herd health evaluations should be made prior to release or turn-out to help reduce the potential for introducing new pathogens or pathogen strains into established bighorn sheep herds. Any physically disabled or sick animals discovered during weed control will be removed promptly from national forest lands.

Revegetation

- Seeding with native seed will only occur if desirable competitive plants do not re-emerge and dominate the vegetation community after the weed species is treated (refer to MBRTB Revegetation Guidelines).

Mechanical treatment

- To limit the potential for equipment to spread invasive plant seeds, mechanical treatments should be completed before seed becomes viable.
- Disposal of plants that are grubbed or manually removed will be as follows: If no flowers or seeds are present, pull the plant and place it off the ground, if possible, to dry out. If flowers or seeds are present, pull and place plants in a plastic bag or a container to retain seeds. Dispose of plants by burning them or taking them in closed garbage bags to a sanitary landfill.
- Delay mowing of grasslands outside mapped prairie dog colonies until July 15 or later to protect ground-nesting birds, including their nests and young broods. Project-level analyses will determine the earliest mowing date (TBNG LRMP).
- Avoid or mitigate mechanical treatment methods that have potential to adversely affect the viability of known sensitive plant species populations.

Ground-based herbicide application

General

- Before spraying herbicides near residential areas, check the sensitivity registry maintained by the Colorado Department of Agriculture for a list of chemically sensitive individuals. Twenty-four hours prior to herbicide application, notify those individuals who are on the registry and have property abutting the treatment area. The registry is for people who have documentation of sensitivity to pesticide products from a licensed Colorado physician. The registry does not prevent application of pesticides but only requires that commercial applicators notify people on the registry 24 hours before an application is made to abutting property so they can leave for a period of time.
- Notify the landowners¹ twenty-four hours before ground spraying within 65 feet of their property located at T14N, R77W, sections 12, 13, 7, and 18. The twenty-four hours' notice is to maintain consistency with the notification requirements for the sensitivity registry maintained by the Colorado Department of Agriculture. Sixty-five feet is the recommended minimal buffer zone for aerial spraying applications in the Missoula Valley. Buffer zones for ground spraying are less than 65 feet (Felsot 2001).
- Herbicides will be used in accordance with U.S. Environmental Protection Agency (EPA) label instructions and restrictions. Label restrictions on herbicides are developed to mitigate, reduce, or eliminate potential risks to humans and the environment. Label information and requirements include personal protective equipment, user safety, first aid, environmental hazards, directions for use, storage and disposal, general information, mixing and application methods, approved uses, weeds controlled, and application rates. It is a violation of federal law to use an herbicide in a manner inconsistent with its labeling.
- Additional herbicides may be considered for use within the project area in the future. Only EPA registered herbicides having a completed risk assessment will be considered for use.
- Adhere to all guidelines and protection measures in the Forest Service Manual 2150, Pesticide Use Management and Coordination, and in the Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook.
- Applicators or operators must wear all required protective gear listed on the label of the herbicide they are using (FSH 6709.11).
- Application will be conducted or supervised by licensed applicators or trained technicians, as required by law.
- Operators will calibrate spray equipment at regular intervals to ensure proper rates of herbicide applications.
- The local herbicide coordinator will maintain daily records of herbicide use, including temperature, wind speed and direction, herbicide and formulation uses, quantity of herbicide and diluting agents applied, location and method of application, acreage, and persons applying herbicides.
- Procedures for mixing, loading, and disposal of pesticides and a spill plan would be followed (Label and FSH 2109.14, 43). All herbicide storage, mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any perennial or intermittent waterway, unprotected ephemeral waterway, or wetland. Herbicide applicators shall carry spill containment equipment and be familiar with and carry an herbicide emergency spill plan.

¹ Mr. and Mrs. Scott B. Smith, 833 State Highway 11, Laramie, WY 82070.

- In occupied public recreation areas (such as developed campgrounds, trailheads, other areas of concentrated use) post notification of the treated area until the area is safe to re-enter as defined by the product label (usually 12 to 48 hours).
- Apply herbicides at concentrations that will avoid tree mortality to protect potential habitat for raptors, lynx, and other key species. Refer to Table A-1 for detailed protection measures in and near wooded areas.
- Prohibit or modify pesticide use where it would have adverse effects on threatened, endangered, proposed, sensitive species or species of local concern, and minimize risk to other non-target species.

Water resources

- Only aquatically approved chemicals will be used over live water (streams, ponds, springs, etc.), including water standing or running in ditches. Weeds overhanging a waterway or growing within the channel should be treated as an aquatic situation (including stock tanks).
- Follow herbicide label restrictions regarding use near functioning potable water sources. Herbicides can have varying setback restrictions near functioning/active potable water intakes. For example, labels of glyphosate products registered for aquatic weed control state, “Do not apply this product in flowing water within 0.5 mile up-stream of active potable water intake”.
- Ground herbicide terrestrial applications will maintain a 50 foot buffer around all water sources/wellheads unless the formulations are approved for “in or near water”.
- In areas with high or unacceptable risk of groundwater contamination, use hand applications (spot treat, wick, etc.); for broadcast application, do not use clopyralid, dicamba, hexazinone, or picloram.
- Locate vehicle service and fuel areas, chemical storage and use areas, and waste dumps and areas on gentle upland sites. Mix, load, and clean on gentle upland sites. Dispose of chemicals and containers in state-certified disposal areas. (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2)
- During use periods, inspect chemical transportation, storage, or application equipment for leaks. If leaks occur, report them and install emergency traps to contain them and clean them up. Refer to FSH 6709.11, chapter 60 for direction on working with hazardous materials. Report chemical spills and take appropriate clean-up action in accordance with applicable state and federal laws, rules and regulations. Contaminated soils and other material shall be removed from NFS lands and disposed of in a manner according to state and federal laws, rules, and regulations (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2).
- Apply chemicals using methods that minimize risk of entry to surface and ground water. Favor pesticides with half-lives of 3 months or less, when practicable, to achieve treatment objectives. Apply at lowest effective rates as large droplets or pellets. Follow the label directions. Favor selective treatment (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2).
- Use only aquatic-labeled chemicals in the water influence zone (Watershed Conservation Practices Handbook FSH 2509.25 – R2 Amendment 2509.25-2006-2).
- Spray only when heavy rain is not expected, per label directions.

Water resources, cont.

- If spraying towards a waterway, clearly mark the edge beforehand.
- Carry herbicide only in secure containers. If non-original containers are used, the product must be clearly identified with accompanying label present.
- Only add surfactants specified on the label to herbicides registered for aquatic use.
- Mix chemicals and rinse equipment well away from the waterway.

Amphibians and aquatic organisms

- Due to toxicity to fish, ester formulations of herbicides (i.e., 2, 4-D ester, triclopyr ester (Garlon 4)) are prohibited from use in streamside or wetland areas where fisheries and aquatic dependent (tadpoles) amphibian life stages occur.
- When ground application of herbicide is necessary within 50 feet of a water body, surveys of the treatment area will be required. If adult northern leopard frogs, wood frogs, or boreal toads are identified, the extent of distribution within the proposed treatment area will be marked on the ground and reported to the district amphibian specialist and invasive plant coordinator. Herbicide will not be sprayed if amphibians are known to be present and cannot be avoided. Hand-pulling or wick application of herbicide will be used instead. If tadpoles or metamorphs are identified, the location will be reported to the local amphibian specialist (fisheries or wildlife biologist) and invasive plant coordinator, and application of herbicides will be delayed until metamorphs disperse.

Sensitive plant species

- Broadcast (boom) applications of chlorsulfuron or sulfometuron methyl are prohibited within 1,500 feet of sensitive plant occurrences. Selective hand spot or wick treatment with this herbicide is allowed within this setback.
- When applying herbicides within 50 feet of sensitive plants, spot treat via hand held wands, backpack sprayers, wick, etc. using an herbicide that does not persist in the soil (picloram and imazapic are more persistent in soils) and protect sensitive plants from herbicide drift; for example, cover plant with plastic when spraying herbicide or use a wick applicator.
- Chlorsulfuron, imazapyr, and sulfometuron methyl are prohibited within the 50-foot buffer zone around sensitive plants. The broad-spectrum herbicide, glyphosate, may be applied within the 50 feet buffer only if the sensitive plant species is dormant.
- Ensure that the herbicide used does not target the family of the specific sensitive plant species. For example, herbicides targeted for the composite/aster family (i.e. aminopyralid, clopyralid) should not be used near Colorado tansyaster occurrences. Monocots (species of grass, sedge, lily and orchid families) are tolerant to clopyralid, 2, 4-D, and triclopyr. Dicamba and picloram are also considered safe around monocots at lower formulations.

Aerial application of herbicides

General

- Before spraying herbicides near residential areas, check the sensitivity registry maintained by the Colorado Department of Agriculture for a list of chemically sensitive individuals. Twenty-four hours prior to herbicide application, notify those individuals who are on the registry and have property abutting the treatment area. The registry is for people who have documentation of sensitivity to pesticide products from a licensed Colorado physician. The registry does not prevent application of pesticides but only requires that commercial applicators notify people on the registry 24 hours before an application is made to abutting property so they can leave for a period of time.
- Notify the landowners² twenty-four hours before aerial spraying within 300 feet of their property located at T14N, R77W, sections 12, 13, 7, and 18. The twenty-four hours' notice is to maintain consistency with the notification requirements for the sensitivity registry maintained by the Colorado Department of Agriculture. Three hundred feet is the minimum buffer for aerial application around campgrounds, recreation residences, and private residential areas (see bullet #6 below).
- All aviation activities will be in accordance with FSM 5700 (Aviation Management), FSM 2150 (Pesticide Use Management and Coordination), FSH 5709.16 (Flight Operations Handbook), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation). A project aviation safety plan will be developed prior to aerial spray applications.
- Any non-selective herbicides that are aerially applied will be used at rates that are low enough to limit injury to desirable species or used during periods when non-target plants are dormant.
- Aerial applications would be excluded from designated Wilderness and Research Natural Areas unless needed on a site-specific basis to protect the native plant populations for which the area is being managed.
- Provide a minimum buffer of 300 feet for aerial application of herbicides from developed campgrounds, recreation residences and private residential areas (unless otherwise authorized by adjacent private landowners). Treat outside of high use periods where feasible. Temporary closures of campgrounds may be considered to ensure public safety during spray operations.
- Signing and on-site layout would be performed one to two weeks prior to actual aerial treatment.
- Temporary area and road/trail closures would be used to ensure public safety during aerial spray operations.
- Constant communications would be maintained between the aircraft and project leader during spraying operations. Ground observers would have communication with the project leader. Observers would be located at various locations adjacent to the treatment area to monitor wind direction and speed as well as to visually monitor drift and deposition of herbicide.
- Herbicides that contain the surfactants POEA (polyoxyethyleneamine) or MON-0818 (polyoxyethylene tallowamine) will not be aerially applied.

² Mr. and Mrs. Scott B. Smith, 833 State Highway 11, Laramie, WY 82070. Email cma@a-hlaw.com

Protection measures to reduce spray drift

- Application will occur only when wind speeds are less than 6 mph (or per label instruction). Spray drift is largely a function of droplet particle size, release height, air temperature and wind speed. Incorporate these factors into project design to reduce the risk of drift.
- Aerial spray units will be field-validated, flagged, and/or marked using GPS prior to spraying to ensure only appropriate portions of the unit are aerially treated. To ensure that aerial treatments stay within intended treatment areas, units will be GPSed before and during the flight.
- A field inspector will be present during all aerial applications to monitor drift using spray detection cards placed in buffer areas. Cards will be placed prior to herbicide application and will be sufficient in number and distribution to adequately determine when drift of herbicide into the buffer area exceeds acceptable levels. Non-toxic dye will be added to make herbicide visible on spray cards. Dye will allow observers to see herbicide as it is sprayed and to visually monitor drift or vortices from boom and rotor tips.
- Drift reduction agents, nozzles that create large droplets, and special boom and nozzle placement, will be used to reduce drift during aerial spraying.
- Drift control agents may be used in aerial spraying during low humidity to reduce drift into non-target areas. Products that reduce volatility, keep droplet sizes larger, and are the appropriate adjuvant for the herbicide (as specified by labeling of both the herbicide and the drift agent, in consultation with the herbicide manufacturer) would be used.
- Aerial spraying will be discontinued if herbicide is drifting within the set-back zone and/or wind speed exceeds those recommended on the product's label.
- Weather conditions will be monitored on-site (temperature, humidity, wind speed and direction), and spot forecasts will be reviewed for adverse weather conditions.
- Maintain boom pressure at less than 40 psi and use nozzles designed for medium to coarse droplet size (240 to 400 microns). Use a drift agent to help maintain large droplet size.
- Monitor treatment boundaries next to sensitive areas with spray deposit cards to detect any possible drift. Train people in how to handle the cards, interpret the cards (many things can contaminate the cards such as dew, moisture from hands, insects) and also document results. Card lines should also be placed in treated areas under full spray to serve as a reference.

Water resources

- During contract preparation for aerial application, reassess surface water quality risk with site-specific information. Once the exact treatment areas are delineated in preparation for the contract, determine treatment acres for 6th hydrologic unit code (HUC) watersheds potentially affected by aerial application if picloram is used. Incorporate these acres into the risk assessment to estimate probable herbicide concentrations and allowable treatment acres. If concentrations of picloram exceed the recommended safe threshold, reduce treatment acres to the allowable amount or use herbicides approved for use near surface water.
- On each side of aquatic, streamside or wetlands areas, establish a 300-foot buffer where aerial applications will not be allowed.

Wildlife and aquatic organisms

- Restrict aerial applications within 1 mile of bald eagle winter roost sites. Applications should not occur before 9:00am or after 3:00 pm to prevent roost disturbance from November 1 through March 31.

Sensitive plant species

- No aerial application of herbicide will occur within a 300 feet of any sensitive plant populations. Buffers around sensitive plants will be generated using the most current species information available, which will include Wyoming and Colorado state records of plant occurrences (databases maintained by Colorado Natural Heritage Program and Wyoming Natural Diversity Database), records in the Forest Service natural resource manager database, and recent field survey results.

General Protection Measures by Resource

Rare Plants

This is not intended to be a list of all the protection measures that will protect rare plants, but rather those designed to protect rare plants under all activities.

- Weed infested sites must be evaluated for federally-listed threatened and endangered and Forest Service regionally listed sensitive (TE&S) plants before treatment. A control plan will be developed to help protect any rare plants present. Crews and/or contractors will be provided maps of all known rare plant occurrences so the sites can be identified and protected. Crews will be trained to identify rare plants so new sites can be identified and protected. The local botanist or designated resource specialist will be consulted prior to treating in the proximity of known rare plant populations.
- Always use the control method with the least impact on the rare plants. For example, pull non-rhizomatous weeds if the roots of the rare plant will not be detrimentally affected by the soil disturbance.

Wildlife and Aquatic Organisms

This is not intended to be a list of all the protection measures that will protect wildlife and aquatic organisms, but rather those designed to protect wildlife and aquatic organisms under all activities.

- No concentrated, intense weed control activities (human disturbance, motorized, mechanical, and aerial applications) will be allowed as listed below:
 - Within mapped prairie dog colonies, no activities will occur from March 15 through July 31 to protect mountain plover during nesting, unless coordinated with district biologist. This will also provide protection for black-footed ferrets, burrowing owls, black-tailed prairie dogs, as well as other grassland sensitive or key species.
 - Within 1 mile of bighorn sheep lambing areas from April 1 through June 30.
 - Within 2 miles of Columbian sharp-tailed grouse, and plains sharp-tailed grouse breeding complexes from March 1 through June 30, unless coordinated with district biologist.
 - Within ½ mile of greater sandhill crane breeding areas from March 1 through June 30.
 - Within ¼ mile of active flammulated owl, short-eared owl, great-horned owl, northern goshawk, Cooper's hawk, and sharp-shinned hawk nests from March 1 through August 30, unless coordinated with district biologist.
 - Within 1 mile of active bald eagle nests from February 1 through August 15.
 - Within ½ mile of active golden eagle nests from February 1 through August 15.
 - Within ½ mile of active ferruginous hawk nests from March 1 through July 31.
 - Within ½ mile of active peregrine falcon, prairie falcon, and merlin nests from March 1 through August 15.

- Within ½ mile of active northern harrier, osprey, Swainson's hawk, and red-tailed hawk nests from March 1 through August 15.
- Design vegetation management activities and pesticide application projects in known habitats of sensitive butterfly species to reduce mortality of butterflies and to maintain or enhance nectar and larvae host plant species.

Herbicide-specific resource protection for environmentally sensitive zones

Herbicides that are approved for rangeland use are generally benign to soil and soil microorganisms in most soil types. Nevertheless, the specific properties of the herbicides considered do require special attention, particularly when used near surface waters, shallow groundwater, domestic water supplies, and woodlands. The protection measures in Table A-1 are intended to minimize contamination of water resources and to minimize injury to non-target desired woody plants from herbicide use in the following environmentally sensitive sites:

- Aquatic Zone (AZ): The area where aquatic plants, floating plants, submersed plants, and emergent plants grow in ponds, lakes, reservoirs, marshes, drainage ditches, and streams that are still or slow moving.
- Streamside Zone (SZ): Moving water systems (lotic) containing, and adjacent to, stream channels and floodplains having the presence of obligate riparian vegetation, facultative (optional or discretionary) riparian vegetation, or both.
- Wetland Zone (WZ) Saturated wetland systems (lentic) that have saturated or seasonally saturated soils and support mostly obligate and facultative wetland vegetation and aquatic life); includes swamps, bogs, potholes, lakes, ponds, man-made reservoirs, and stock ponds.
- Groundwater Vulnerable Zone (GVZ): Shallow groundwater areas underlying permeable soils that are especially vulnerable to contamination from some herbicides.
- Wellhead Protection Areas (WPA): A 50-foot radius around an underground developed and functioning source of drinking water.
- Woodland Zone (WDZ): Hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.

Table A-1: Protection measures for environmentally sensitive zones by herbicide.

Management Zone ⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas.	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
General Protection Measures	<ul style="list-style-type: none"> Only those formulations that have been approved for use in or adjacent to water are permitted^{vii}. All other formulations are prohibited. Only surfactants labeled for use in & around water would be permitted. 	<ul style="list-style-type: none"> Ground based boom application is allowed up to 50 feet from water's edge. Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, wicking, etc.). If allowed by the label, wicking applications up to the water's edge is allowed, including use of the otherwise "prohibited" or "limited" herbicides.^{viii} Only surfactants labeled for use in and around water would be permitted. Due to toxicity to fish, ester formulations of herbicides are prohibited where fisheries occur 	<ul style="list-style-type: none"> Same Protection Measures as SZs. 	<ul style="list-style-type: none"> Use hand application, or for broadcast application use an alternate herbicide with a lower leachability than clopyralid, dicamba, hexazinone or picloram The same prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with exceptions listed below. 	<ul style="list-style-type: none"> Unless otherwise directed by label, ground herbicide application within a 50 foot radius of functioning potable water intakes / wellheads should use only products approved for use in or near water. 	
2, 4-D ^{ix} Thistles, sulfur cinquefoil, dyers woad, knapweeds, purple loosestrife, hoary cress, Some broadleaf, woody and aquatic plants susceptible. Amine is labeled for terrestrial and aquatic use. Hi-Dep IVM is labeled for terrestrial applications, and non-irrigation ditchbanks.	<p>Use Permitted</p> <ul style="list-style-type: none"> Aquatic formulations only Consult with Fisheries Specialist. <p>Use Prohibited</p> <p>Non-aquatic formulations</p>	<p>Limited Use</p> <ul style="list-style-type: none"> Use only formulations approved for use in or near water. In the amine form or aquatic labeled formulations it can be applied up to the water's edge (without direct contact to the water). <p>Use Prohibited</p> <p>Non-aquatic formulations</p>	<p>Same as SZ for 2, 4-D except:</p> <ul style="list-style-type: none"> Allowed up to 25 feet from water's edge if there is a vegetative buffer^x with slopes <6% 	<p>Use Permitted</p> <ul style="list-style-type: none"> Aquatic or non-aquatic 2, 4-D may be applied. 	<p>Limited Use</p> <ul style="list-style-type: none"> Same as SZ and GVZ for 2, 4-D. 	<p>Limited Use</p> <ul style="list-style-type: none"> Spot treatment only within 50 feet of woodlands. Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil.
Aminopyralid ^{xi} Perennial and biennial thistles, knapweeds, sulfur cinquefoil. Tolerated by most grasses. Milestone is labeled for terrestrial applications. Do not apply in surface water	<p>Use Prohibited</p>	<p>Permitted Use</p> <p>It can be applied up to the water's edge (without direct contact to the water).</p> <ul style="list-style-type: none"> Per label instruction, not to be used in areas of standing water. 	<p>Use Permitted</p> <p>Per label instruction, not to be used in areas of standing water.</p>	<p>Use Permitted</p>	<p>Use Permitted</p>	<p>Limited Use</p> <p>Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.</p>

Management Zone ⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas.	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
Chlorsulfuron ^{xii} Spot treatment only with hand application methods. Dyer's woad, thistles, common tansy, hoary cress, houndstongue. Some broadleaf plants and grasses susceptible. Telar is labeled for terrestrial use only.	<i>Use Prohibited</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Do not use in flooded areas or on saturated soils. Spot treatment allowed up to 5 feet from water's edge. Use only once per growing season on alkaline soils. 	<i>Same as SZ except:</i> <ul style="list-style-type: none"> Spot treatment allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6%. 	<i>Use Permitted</i>	<i>Use Prohibited</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.
Clopyralid ^{xiii} Thistles, yellow starthistle, knapweeds, oxeye daisy. Many broadleaf and woody species susceptible. Transline is labeled for terrestrial applications. Do not apply in or near surface water. Do not contaminate water used for irrigation or domestic purposes.	<i>Use Prohibited</i>	<i>Use Prohibited</i> <ul style="list-style-type: none"> Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet, if allowed by the label. 	<i>Same as SZ</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Hand application only. Broadcast application prohibited. 	<i>Use Prohibited</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Spot treatment only within 50 feet of non-targeted woodlands. Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil
Dicamba ^{xiv} Houndstongue, knapweeds, oxeye daisy, leafy spurge, tansy ragwort, yellow starthistle. Some broadleaf, brush, vines susceptible Vanquish and Banvel are labeled for upland sites and non-irrigation ditchbanks	<i>Use Prohibited</i>	<i>Use Prohibited</i> <ul style="list-style-type: none"> Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet, if allowed by the label. 	<i>Same as SZ</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Hand application only. Broadcast application prohibited. 	<i>Use Prohibited</i>	<i>Limited Use</i> <ul style="list-style-type: none"> Spot treatment only within 50 feet of non-targeted woodlands. Do not use within 3 times the dripline of trees and shrubs (conifers especially sensitive). Avoid direct or indirect application to non-target plants or soil.

*Medicine Bow-Routt National Forests
and Thunder Basin National Grassland*

Management Zone ⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas.	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
Fluroxypyr ^{xv} Common mullein, field bindweed, leafy spurge, musk thistle, black henbane Labeled for use in pine plantations, rangeland and non-cropland areas. Do not apply directly to water, avoid drift or run-off. Hazardous to aquatic organisms. Vista Specialty Herbicide and Vista XRT are labeled for the control of broadleaf weeds in rangeland, and grazed areas as well as for the control of woody brush.	<i>Use Prohibited</i>	<i>Use Prohibited</i>	<i>Use Prohibited</i>	<i>Limited Use</i> • Hand application only. Broadcast application prohibited.	<i>Use Prohibited</i>	<i>Limited Use</i> • Spot treatment only within 50 feet of woodlands. Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil.
Glyphosate ^{xvi} Purple loosestrife, field bindweed, yellow starthistle, thistles, cheatgrass, toadflax. Glyphosate does not work on underwater plants such as Eurasian watermilfoil. Broad spectrum. Accord, Glypro, and Rodeo are labeled for certain aquatic weed control applications. The other products are for terrestrial applications, including ditch banks, and dry ditch or canal bottoms.	<i>Use Permitted</i> • Aquatic formulations only • Consult with Fisheries Specialist. <i>Use Prohibited</i> Non-aquatic formulations	<i>Limited Use</i> • Use only formulations approved for use in or near water (i.e. Glypro, Rodeo). • Spot treat target plants only within riparian area to avoid injury to non-target riparian plants. <i>Use Prohibited</i> Non-aquatic formulations	<i>Same as SZ</i>	<i>Use Permitted</i>	<i>Use Permitted</i> • Use only formulations approved for use in or near water	<i>Limited Use</i> • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.

Management Zoneⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas.	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
Hexazinone Cheatgrass, oxeye daisy, yellow starthistle, thistles. Broad spectrum control with some selectivity for conifers. Velpar and Pronone are labeled for terrestrial applications.	<i>Use Prohibited</i>	<i>Use Prohibited</i> • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet	<i>Same as SZ</i>	<i>Limited Use</i> • Hand application only. Broadcast application prohibited.	<i>Use Prohibited</i>	<i>Limited Use</i> • Follow Label direction in and near conifers. • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.
Imazapic ^{xvii} Cheatgrass, leafy spurge, toadflax. Some broadleaf plants and grasses susceptible. Plateau is labeled for terrestrial use only. Do not apply near water.	<i>Use Prohibited</i>	<i>Limited Use</i> • Maximum of 0.188 lb a.e./ac. • Allowed up to 5 feet from water's edge if there is a vegetative buffer that has slopes <6%	<i>Same as SZ</i>	<i>Limited Use</i> • Maximum of 0.188 lb a.e./ac. • Exception: No slope limitations	<i>Use Prohibited</i>	<i>Limited Use</i> • When making fall applications, potential injury to tree and brush species from foliar contact may be minimized by making the application after the leaves have begun to senesce (fall color) or after leaf drop. Conifers are generally tolerant to fall applications. Applications in and around tree and brush species should be made at the recommended timing for the target weed species.
Imazapyr ^{xviii} Saltcedar, purple loosestrife, dyers woad, field bindweed. Imazapyr does not work on underwater plants such as Eurasian watermilfoil. Broad spectrum. Arsenal is labeled for uplands, non-tidal wetlands where surface water is not present, non-irrigation ditchbanks, and ditchbottoms where only isolated puddles of surface water occur.	<i>Use Permitted</i> • Consult with Fisheries Specialist.	<i>Limited Use</i> • Use of Habitat or Arsenal on cut stump or hand spraying salt cedar may come into contact with surface water per label instruction. • For all other species, use of Imazapyr is allowed up to 5 feet from water's edge if there is a vegetative buffer that has slopes <6%.	<i>Same as SZ for Imazapyr</i>	<i>Use Permitted</i> • Exception: No slope limitations	<i>Use Prohibited</i>	<i>Limited Use</i> • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.

*Medicine Bow-Routt National Forests
and Thunder Basin National Grassland*

Management Zone ⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas. .	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
Metsulfuron methyl ^{xix} Houndstongue, thistle, sulfur cinquefoil, dyers woad, purple loosestrife, common tansy, hoary cress. Escort is labeled for Terrestrial applications. Escort can be applied to floodplains, terrestrial areas of deltas, and drained areas of low-lying areas where there may be isolated puddles.	<i>Use Prohibited</i>	<i>Use Prohibited</i> • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet.	<i>Same as SZ</i>	<i>Use Prohibited</i>	<i>Use Prohibited</i>	<i>Limited Use</i> • Spot treatment only within 50 feet of woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.
Picloram ^{xx} Thistles, yellow starthistle, knapweeds, common tansy, toadflax, leafy spurge. Grasses are tolerant. Tordon is labeled for terrestrial applications. Should not be used where conditions favor off-site movement due to leaching or run-off.	<i>Use Prohibited</i>	<i>Use Prohibited</i> • Within 50 feet of water's edge. Exception: Wicking applications may occur within 50 feet, if allowed by the label.	<i>Same as SZ</i>	<i>Limited Use</i> • Hand application only. Broadcast application prohibited.	<i>Use Prohibited</i>	<i>Limited Use</i> • Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants, especially within 3 times the dripline of trees and shrubs. Avoid direct or indirect application to non-target plants or soil.
Sulfometuron methyl ^{xxi} • Spot treatment only with hand application methods. Cheatgrass, hoary cress, oxeye daisy, musk thistle. Broad spectrum. Oust: - Do not apply near open water.	<i>Use Prohibited</i> • Broadcast application prohibited within 100 feet of AZs. • Aerial application prohibited within 1500 feet of AZs. ^{xxii}	<i>Limited Use</i> • Allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6%.	<i>Same as SZ</i>	<i>Use Permitted</i>	<i>Use Prohibited</i>	<i>Limited Use</i> • Spot treatment only within 50 feet of woodlands or under canopy of desired woody plants. Do not apply over canopy in non-targeted areas. Avoid direct or indirect application to non-target plants or soil.

Management Zone ⁱ						
	Aquatic Zone (AZ) includes ponded or slow waters that support aquatic plants (i.e. purple loosestrife) ⁱⁱ	Streamside Zone (SZ) ⁱⁱⁱ includes perennial and intermittent stream riparian areas. .	Wetland Zone (WZ) are the seasonal and permanent wetlands	Groundwater Vulnerable Zone (GVZ) ^{iv} the shallow groundwater beneath permeable soils; most often riparian areas. ^v	Wellhead Protection Zone (WPZ) ^{vi} is a 50 foot radius around an underground developed and functioning source of drinking water.	Woodland Zone (WDZ) includes hardwood draws, stands of conifers, stands of juniper, aspen groves, and riparian forest stands. Saltcedar areas are not considered woodlands.
Triclopyr ^{xxiii} <ul style="list-style-type: none"> Do not use high application rates in order to avoid potential hazards to birds and mammals The use of Triclopyr is limited to selective application techniques only (e.g., spot spraying, wiping, basal bark, cut stump, injection). No aerial spraying. Purple loosestrife, sulfur cinquefoil, knapweed, oxeye daisy, thistle. Woody, some broadleaf & root-sprouting species are susceptible. Grasses are tolerant. Renovate3 is labeled for aquatic applications. Garlon 3A, Garlon 4, and Pathfinder II is labeled for Upland sites, non-irrigation ditchbanks, and seasonally dry wetlands, floodplains, deltas, and transition areas between uplands and wetlands. Do not apply directly to water.	Use Permitted <ul style="list-style-type: none"> Aquatic formulations only Consult with Fisheries Specialist. Use Prohibited <ul style="list-style-type: none"> Non-aquatic formulations 	Limited Use <ul style="list-style-type: none"> Use only formulations approved for use in or near water. Aquatic labeled formulations can be applied up to the water's edge (without direct contact to the water). Use Prohibited Non-aquatic formulations	Same as SZ	Use Permitted	Use Prohibited	Limited Use <ul style="list-style-type: none"> Spot treatment only within 50 feet of non-targeted woodlands or under canopy of desired woody plants. Avoid direct or indirect application to non-target plants or soil.

ⁱ Follow label direction as it pertains to use in irrigation ditches.

ⁱⁱ AZs. For ponds with heavy weed infestation, partial treatments may be necessary to prevent oxygen depletion and possible fish suffocation associated with decaying vegetation.

ⁱⁱⁱ SZs. Aminopyralid, and formulations of 2,4-D amine, glyphosate (i.e., Glypro and Rodeo), and triclopyr (i.e. Renovate 3) approved for use in or near water are compatible for use in SZs and can be applied to the water's edge. Glyphosate is injurious to some desired riparian plants, so it must be applied by spot treatments to target plants within a riparian area. Where 5 foot setbacks from water's edge are in place, alternative treatments may include use of permitted herbicides, wick applications, biocontrols, mechanical options, and/or herbivory by goats or sheep.

^{iv} Most herbicide groundwater contamination results from "point sources." Point source contaminations include spills or leaks at storage and handling facilities, improperly discarding containers, and rinsing equipment in loading and handling areas, often times into adjacent drainage ditches. Point sources are characterized by discrete, unidentifiable locations discharging relatively high local concentrations. These contaminations can be avoided through proper calibration, mixing, and cleaning of equipment. Non-point source groundwater contaminations of herbicides are relatively uncommon. They can occur, however, when a mobile herbicide is applied in areas with a shallow water table. In this situation, the choice of an appropriate herbicide or alternative control strategy can prevent contamination of the water source. Water tables can shift seasonally and annually; therefore, the depth to water table can be monitored prior to application of a prohibited or limited herbicide within a GVZ. For example, areas that customarily have high water tables early in the growing season may be suitable for herbicide treatment by the fall if preceding precipitation is low. Glyphosate and amine formulations of 2,4-D and triclopyr are currently labeled for aquatic use and would be the materials used within designated buffer zones along streams and bodies of water. Imazapic, imazapyr, and triclopyr could be used in buffer zones as long as they are not directly applied to water.

^v Most of the GVZs are found along SZs and WZs. Use the same chemical prohibitions, limitations, and uses listed under the SZs and WZs apply to GVZs with the listed exceptions by herbicide.

^{vi} WPZs. Biological controls, herbivory, or mechanical options will be emphasized where feasible and effective.

^{vii} AZs. These formulations labeled for aquatic use target broadleaf plants (dicots) such as purple loosestrife. Most native aquatic plants are monocots and not susceptible to these chemicals.

^{viii} Although applications by other means are prohibited or limited within 5- feet of water in SZs, wicking application of prohibited herbicides is allowed up to the water's edge due to direct foliage treatment with no drifting or direct application to soil, if allowed by the label.

^{ix} The more restrictive setback distance in WZs than SZs reflects the persistence of 2,4-D and chlorsulfuron in anaerobic conditions, which are more likely to exist in lentic water systems (wetlands) and wetland soils than in lotic (riverine) environments. GWZs: Only formulations approved for in and near water (such as 2, 4-D and glyphosate) will be the only herbicides approved for use within a WPZ. These chemicals have low to intermediate leaching potential.

^x Vegetative buffer is an area with good vegetative ground cover. Badlands or other low cover areas with bare ground would not be considered as a vegetative buffer.

^{xi} SZs. *Limited Herbicides*. Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. The use of aminopyralid is effective on a narrow spectrum of plants (especially knapweeds and thistles) and can generally be used in SZs where standing water does not occur.

^{xii} SZs. *Limited Herbicides*. Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. Use of chlorsulfuron must avoid flooded areas and anaerobic conditions, which commonly occur in

saturated soils. The risk of flooding along some perennial streams is seasonal; therefore, use of chlorsulfuron may be restricted temporally during periods when there is a high probability of flooding. The more restrictive setback distance in WZs than SZs reflects the persistence of 2,4-D and chlorsulfuron in anaerobic conditions, which are more likely to exist in lentic water systems (wetlands) and wetland soils than in lotic (riverine) environments.

^{xiii} *SZs: Prohibited Herbicides.* Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Triclopyr targets many of the same noxious weeds as clopyralid and has been formulated for use near water. Consequently triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

^{xiv} *SZs: Prohibited Herbicides.* Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Even though dicamba has low persistence, it is very mobile, easily leached, and breaks down slowly in water or in water-saturated soil. The weeds, which dicamba targets, generally do not occur in wetland or riparian settings. Therefore, the prohibition of dicamba has little bearing on management options. WZs.: Dicamba can injure woody plants by being exuded through weed roots and being taken up by trees and shrubs within three times their drip lines.

^{xv} Fluroxypyr is toxic to fish. Leachability is moderate.

^{xvi} *GWZs.* Only chemicals with a low to intermediate leaching potential will be approved for use within a WPZ.

^{xvii} *SZs. Limited Herbicides.* Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. The use of imazapic is desirable because it acts on a narrow spectrum of plants and is generally non-injurious to non-target forbs at low application rates and when applied after seed-set has occurred. Furthermore, imazapic is rapidly photodegraded by sunlight in surface waters. Imazapic and imazapyr are limited to reaches where a well vegetated buffer zone exists and grounds slopes are less than 6 percent imazapic is 0.188 lb acid equivalent/acre, based on studies that demonstrate limited mobility at this and lower application rates (BASF Corporation, 2006, p. 4). The slope restrictions on imazapic and imazapyr do not apply within a GVZ because physical translocation of soil-adsorbed chemicals will not affect the groundwater.

^{xviii} *SZs. Limited Herbicides.* Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations. Imazapic and imazapyr are limited to reaches where a well vegetated buffer zone exists and grounds slopes are less than 6 percent between the application site and surface water. These requirements are imposed to keep these herbicides from entering surface water via runoff from overland flow. Imazapyr may be transported on eroded soil particles. Setback and vegetation buffer limitations have been applied to minimize soil transport when imazapyr is applied near water. The slope restrictions on imazapic and imazapyr do not apply within a GVZ because physical translocation of soil-adsorbed chemicals will not affect the groundwater.

^{xix} *SZs: Prohibited Herbicides.* Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Metsulfuron methyl is slow to break down in surface water, especially alkaline waters. Triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

^{xx} *WZs.* Picloram can injure woody plants by being exuded through weed roots and being taken up by trees and shrubs within three times their drip lines.

^{xxi} *SZs.* Sulfometuron methyl limitations are designed to prevent transportation to surface water by overland flow.

^{xxii} USDI BLM 2005

^{xxiii} *SZs: Prohibited herbicides.* Herbicides that are prohibited within 50 feet of water are very mobile with generally moderate persistence. Triclopyr targets many of the same noxious weeds as clopyralid and has been formulated for use near water. Consequently, triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SZ.

